Randomized Algorithms. Exercises for 06.10

October 2, 2009

We will discuss exercises 3.2 and 3.4-3.6 (in the main text) from the book. Please study these exercises at home, write down a solution to at least one exercise of your choice and prepare to present a solution to at least one more of the exercises in the class on Tuesday.

For those of you who do not (yet) have a copy of the book, the following is a "short version" of these exercises.

ex.3.2 For every positive k describe a random non-negative variable X such that

$$PR[X \geq kE[X]] = \frac{1}{k}$$

ex.3.4 The restart probability of the randomized selection algorithm (Lazy Select) may be driven down on the expense of the running time of the algorithm. Express the running time of a single loop as $cn + o(n)$ with $c \geq 2$ and bound the probability of restart as a function of c.

ex.3.5 Suggest a modification of the algorithm that brings the constant in the linear term down to 1.5 from 2, such that the probability of restart still tends to 0 as $n \to \infty$.

ex.3.6 Show that the expected running time of Lazy Select is $2n + o(n)$.